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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

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Federal Grand Jury Returns Fertilizer Indictment

Long Deliberations End in Citation Against 64 Corporations, 2 Associations and 36 Individuals. Brand Issues Statement.

ON February 10th, the special Federal Grand Jury, which has been engaged at Winston-Salem, N. C., for almost a year in an investigation of the fertilizer industry, returned an indictment of 102 defendants, comprising 2 associations (The National Fertilizer Association and the Superphosphate Association), 64 fertilizer manufacturing and distributing corporations, and 36 officials of the associations and corporations.

The document covers about 100 pages and contains two counts. Count I charges the defendants with a combination and conspiracy to fix, determine, establish, and maintain uniform, arbitrary, and non-competitive prices for the sale of fertilizer. Count II charges a combination and conspiracy unreasonably and unduly to eliminate, limit, suppress, and restrict competition among themselves and with other producers, sellers, and distributors of fertilizer. The defendants are charged with having adopted and used numerous means, methods, and devices for accomplishing these purposes.

No time has been set for the trial of the indictments.

Statement by Charles J. Brand

"Fertilizer prices are lower than prices paid by farmers for other commodities and fluctuate widely," said Charles J. Brand, Executive Secretary and Treasurer of The National Fertilizer Association, in commenting on the indictment.

"An indictment or true bill," Br. Brand reminded, "is not a verdict of guilty as so many people seem to think—it is, in fact, not even an indication of guilt. It is only a formal accusation made by at least 12 out of 23 grand jurors after an investigation conducted by the Government, at hearings where for the most part only the Government's side is heard. An advisor to the Antitrust Division of the Department of Justice recently said in a report to the so-called Anti-Monopoly Committee: 'Nominally the grand jury has the power to indict or refuse to indict; in reality it usually does the will of the prosecuting attorney into whose hands the real discretion has passed.' Even in such one-sided Government proceedings, the grand jury in this instance required one year before it decided that the fertilizer companies should be formally accused.

Prices Low and Fluctuating

"This charge of price-fixing comes to us in the face of the fact that over 800 independently operating fertilizer plants in this country have shown, according to the Government's own figures, a record of years of fluctuating prices and of very low prices," said Mr. Brand. "The latest U. S. Department of Agriculture figures show farmers are receiving 101 per cent of the 1910-14 average for what they sell, and are paying 122 per cent on the average for the commodities which they buy. For fertilizer, however, they pay only 96 per cent. If prices for fertilizer in 1940 had been as high as the average price of other things they buy, the farmer's fertilizer bill would have been $54,000,000 more. The Department of Agriculture further says that 'fertilizer prices as a percentage of the 1910-14 average are considerably lower than the prices of most commodities bought by farmers.'

"Fertilizer prices have been anything but rigid. They fell 39 per cent between 1929 and 1933—this drop was greater than the all-commodity drop. Fertilizer prices have never

recovered to the extent that other prices have. The average price of the most widely used grade was $22.40; $14.77 in 1933, and $17.12 in 1938.

Profits Low—Farmers' Returns High

"If this widely scattered industry had the power to fix prices, it seems that they would have fixed them at profitable figures," stated Mr. Brand. "As it stands the manufacturer got a profit of only 1¼ cents out of each dollar the farmer spent for fertilizer. Roughly this is 31 cents a ton on a $25.00 per ton fertilizer. This is based on the latest figures released by the Bureau of Internal Revenue on income tax returns filed over a ten-year period. A recent Securities and Exchange Commission report for 21 large corporations showed net profits amounting to 19½ per cent of sales—somewhat different from 1¼ per cent in the fertilizer industry.

"The return the farmer receives is in sharp contrast with the industry's—a fact which we do not deplore. According to a survey based on personal interviews with 32,000 farmers, they received an average return of $3.60 for each dollar spent for fertilizer. Over 10,000 cotton growers reported a return of $4.47 for each fertilizer dollar, and 5,000 tobacco growers got back $9.04 for each dollar spent for fertilizer.

"Plant food content of fertilizer has steadily increased, too," explained Mr. Brand. In 1940 a ton of fertilizer contained over 33 per cent more plant food than in 1910, and sold at a price only slightly higher than at that time.

Association Work

"So far as The National Fertilizer Association is concerned, it has been in existence since 1893 and has made a life-time job of helping the farmers to get a greater financial return from the use of their lands. The success of the industry is based upon profitable returns for farmers.

"The Association is willing to be judged by its record. It has cooperated effectively with farmers and farm leaders, including particularly State and Federal agricultural workers, in both the encouragement of research and bringing farmers the results of research in terms of practical application.

"The Association has cooperated with these agencies in the study and intelligent answering of many questions important to the farmers' welfare—such questions as: What conditions contribute to the best use of fertilizer? What fertilizer is most suitable for certain crops and certain soils? How much fertilizer should farmers use with certain crops? How should they apply it?

"The Association has issued millions of copies of magazines and pamphlets and books carrying these findings on best fertilizer use far and wide. In them all other factors of good farming are emphasized. Its educational charts and motion pictures are used throughout the agricultural schools and farm meetings of the Nation. They all bring facts that put dollars in farmers' pockets. One may fairly wonder why an industry that provides so valuable a service to American farmers at such low prices and with such meager profits is subjected to such attack."

PUERTO RICO BUYS MORE FERTILIZER

Puerto Rico's purchases of fertilizer from continental United States broke all records during 1940, totalling 137,000 tons or 53 per cent more than in the preceding year, according to a statement by the Puerto Rican Trade Council, based on U. S. Department of Commerce figures.

Shipments of ammonium sulphate to the island were 68 per cent greater than in 1939, totalling 78,100 tons, the Council said.

The increased demand for fertilizer in the territory last year was due partly to the fact that the sugar industry was permitted to harvest enough sugar-cane, over and above current quota requirements, to build up a normal carryover, the Council explained.

Puerto Rico's purchases of all goods from continental United States during the year were valued at $103,980,000, an increase of 20 per cent, the Council reported.

COTTON ACREAGE TO BE REDUCED

A cotton acreage allotment of 26,699,917 acres for 1941 has been announced by the Agricultural Adjustment Administration. Last year's quota amounted to 27,070,173 acres, with about 25,000,000 acres actually planted. The 1940 crop totaled 12,686,000 bales. The loss of foreign markets because of the war and the accumulation of large surpluses have made necessary the continuance of restricted plantings. A supplementary program for voluntary reduction of cotton acreage below the 1941 allotment has been announced by the Department of Agriculture. Cooperating cotton farmers will be paid for further reduction in acreage with stamps which may be used to purchase cotton goods. It is estimated that production may be reduced by about 1,000,000 bales.

Proposed Merger of I. A. C. and Union Potash and Chemical Co.

A SPECIAL meeting of stockholders of Union Potash & Chemical Company, a Colorado corporation, 94.89 per cent of whose outstanding preferred stock and 55.86 per cent of whose common stock is presently owned by International Agricultural Corporation, has been called for March 11, 1941, in Denver, to approve a proposed agreement of merger between Union Potash & Chemical Company and International Agricultural Corporation. The agreement provides for the merger of International Agricultural Corporation, with Union Potash & Chemical Company, the name of which will be changed, upon consummation of the merger, to International Minerals & Chemical Corporation. In the event of favorable consideration of the merger agreement by Union Potash & Chemical stockholders, a special meeting of the stockholders of International Agricultural Corporation will be called to approve the agreement.

International Agricultural Corporation is the country's largest producer of phosphates for fertilizer purposes, and its merger with Union Potash & Chemical Company, which produces various grades of potash salts, would assure to the continuing corporation adequate sources of supply for two of the three basic raw materials required for fertilizers.

Union Potash & Chemical Company commenced production during October, 1940, and it has become apparent that the proposed merger will eliminate certain problems relating to banking, management, process rights, and taxes which have already manifested themselves. According to the management, these developments make it increasingly important that the problems arising from the operation of the two companies as separate entities be eliminated with the least possible delay. The proposed agreement of merger has been carefully formulated in order to take advantage of all possible savings, and the basis for the exchange of securities has been developed in consultation with certain holders of substantial amounts of the different classes of stock of each company involved, as well as with the International Agricultural Corporation Common Stockholders' Committee which was organized in January, 1940, in connection with the company's recapitalization plan dated December 5, 1939.

Holders of the 4,000 outstanding shares of preferred stock, no par value, of Union Potash & Chemical Company (exclusive of the 74,421 shares of this stock held by International Agricultural Corporation) will receive for each 4 shares held, including accumulated unpaid dividends and interest thereon, 1 share of 4 per cent cumulative preferred stock of the continuing corporation. The agreement of merger provides that the continuing corporation will, at the option of these holders of old preferred stock of Union Potash & Chemical, within 30 days after consummation of the merger, purchase the 1,000 shares of 4 per cent cumulative preferred stock of the continuing corporation issued or issuable to these stockholders, or any of them, at a price of $100 per share. Shares so purchased will be cancelled and will not be subject to re-issue.

Holders of the 249,500 shares of outstanding common stock of $1 par value of Union Potash & Chemical Company (exclusive of the 315,763 shares of this stock held by International Agricultural Corporation) will receive for each share held four-fifths of a share of common stock of the continuing corporation.

Under the terms of the merger agreement to be voted upon, holders of the present 7 per cent prior preference cumulative stock, $100 par value, of International Agricultural Corporation will receive for each share held, including accumulated and unpaid dividends thereon, 1 share of 4 per cent cumulative preferred stock, $100 par value, of the continuing corporation, together with 3½ shares of common stock of the continuing corporation.

Holders of the present common stock of International Agricultural Corporation will receive for each share held one-quarter of a share of common stock of the continuing corporation.

No stock of the continuing corporation will be issued with respect to the 74,421 shares of old preferred stock and 315,763 shares of old common stock of Union Potash & Chemical Company owned by International Agricultural Corporation, all of which shares of stock will, upon consummation of the merger, be surrendered for retirement and cancellation.

Upon consummation of the merger, the continuing corporation will have an authorized and outstanding issue of 101,000 shares of 4 per cent cumulative preferred stock and an au-authorized issue of 700,000 shares of common

(Continued on page 26)

NO SHORTAGE OF INSECTICIDES

Available supplies of insecticides and fungicides necessary to agriculture are not threatened by curtailment of shipments from abroad, it is reported by officials of E. I. du Pont de Nemours & Company. Domestic manufacture is fully adequate to the nation's needs, with only "nominal" changes in price structure.

"The United States is now wholly self-sufficient in the chemicals commonly used to combat insect and fungus pests," a company spokesman said. "Lead arsenate, calcium arsenate, Bordeau mixture, lime-sulphur solution, tobacco spray products, spray oils and dust mixtures are readily procurable. New products now finding their way into the agricultural field can be produced in this country even under the most drastic conditions."

Continuing efforts are being made by scientists to improve present products and effect economies in their manufacture. The Du Pont Company operates a laboratory here devoted exclusively to pest control research. Along with its search for more effective insecticides is a program of finding domestic raw materials for their production.

Recently, a synthetic product was developed to supplement pyrethrum, the lethal ingredient of many insect sprays. This new man-made product will doubtless replace in large part the pyrethrum flowers formerly imported from Asia and Central Europe.

FARM INCOME INCREASES

Prices received by farmers advanced during the month ended January 15th to 104 per cent of 1910-1914 average. This is the highest point since November, 1937. The index a year ago was 99.

January Tag Sales

Sales of fertilizer tax tags in January were well above last year, according to reports by State control officials to The National Fertilizer Association. Totaling 545,772 tons in the 17 reporting States, they exceeded January, 1940, by 19 per cent and January, 1939, by 21 per cent.

A widespread increase in January sales in the Southern States more than offset a decline in the Midwest. Eleven of the 12 States in the South reported increases over last year, with the rise for the region as a whole amounting to 27 per cent. Virginia reported a small decline. Sales in the first seven months of the current fiscal year were 8 per cent above the corresponding period of the preceding year, with increases taking place in nine States.

In the Midwest increases over January, 1940, in Kentucky, Missouri, and Kansas failed to offset a sharp drop in Indiana and a more moderate decline in Illinois. Indiana sales a year ago were abnormally large. July-January sales in the Midwest were slightly below last year, with the decline due entirely to the decreased volume in Indiana.

FERTILIZER TAX TAG SALES

State	January				July-January			
	1941		1940	1939	1941		1940	1939
	Per Cent of 1940	Tons	Tons	Tons	Per Cent of 1940	Tons	Tons	Tons
Virginia	96	32,650	34,073	39,007	96	134,384	139,510	145,337
N. Carolina	130	107,548	82,683	132,355	109	215,424	198,550	239,989
S. Carolina	111	50,102	45,145	52,436	113	100,908	89,090	90,275
Georgia	158	45,082	28,487	36,269	179	96,587	54,103	108,274
Florida	108	81,094	75,196	70,308	98	359,065	367,163	353,191
Alabama	128	42,900	33,600	35,950	117	60,100	51,250	44,100
Mississippi	116	63,250	54,450	19,150	84	90,913	107,615	47,032
Tennessee	...	7,658	100	2,705	229	35,126	15,369	21,531
Arkansas	150	28,550	19,050	14,550	128	36,200	28,300	20,500
Louisiana	176	38,950	22,150	20,800	107	63,064	59,162	47,370
Texas	148	20,360	13,793	13,025	128	36,653	28,645	25,389
Oklahoma	150	2,500	1,662	2,250	143	4,415	3,086	3,585
Total South	127	520,644	410,389	438,805	108	1,232,839	1,141,843	1,146,573
Indiana	18	7,761	42,125	6,419	79	117,129	147,956	114,158
Illinois	85	923	1,080	1,278	110	16,473	14,961	14,351
Kentucky	248	6,088	2,450	3,423	110	32,928	29,903	22,068
Missouri	346	7,016	2,029	1,176	140	68,414	48,894	46,729
Kansas	352	3,340	950	180	134	18,558	13,861	14,717
Total Midwest	52	25,128	48,634	12,476	99	253,502	255,575	212,023
Grand Total	119	545,772	459,023	451,281	106	1,486,341	1,397,418	1,358,596

Recent Experience With Phosphate Fertilizer*

By OLLE FRANCK**

(Continued from the February 1 issue)

The Effect of Liming

It has long been known that liming serves to liberate phosphoric acid from the soil, thus indirectly exerting a phosphate fertilizing action. And this is also in full agreement with Mattson's findings in connection with the influence of the ratio between the base and the acid content.

Long and extensive farming experiments carried on by the (Swedish) Department of Agriculture also show that in a sour soil whose phosphate condition is unsatisfactory, lime exerts a phosphate fertilizing effect which is very strong and very enduring. Admitting that the phosphate supply is more quickly used up through liming, then the old proverb which says that "the lime makes rich parents but poor children" expresses, so far as it goes, an important truth. It is therefore necessary to take into account not only lime, but lime plus fertilizer.

Studies have also been carried on for determining the behavior of the plant-food material in the solid excreta which grazing animals leave in the fields. It was found that the phosphorus content on those places where no manure droppings were deposited was, as expected, highest in the surface layer (0 to 2 inches). The longer the manure droppings were deposited, the higher was the phosphate content in the surface layer, and after three months it had increased five-fold. It is remarkable, however, that the phosphorus content in the layer below, two to four inches, had also increased more than four-fold. On the basis of prior experience in the employment of phosphate-bearing commercial fertilizer as a top dressing, no increase in the phosphate content was to be expected except in a few inches at the very top.

For the purpose of further studying the problem, further experiments were carried out with two different types of soils, one a very acid clay soil, and the other a sandy soil. These soils were placed in conventional boxes of the Mitscherlich type. On the surface was first spread some finely pulverized superphosphate, then some stable manure, then more superphosphate, and finally more stable manure on top. This was then wet six times at intervals of about fourteen days with water corresponding to about forty inches of rainfall. The water that ran through amounted to about 70 per cent of the total precipitation. The phosphate supplied corresponded to about 71 pounds of superphosphate per acre. The stable manure corresponded to about 66 tons per acre. During the experimenting period there was liberated from the stable manure an amount of phosphate corresponding to about 880 pounds of 20% superphosphate.

After three and a half months the experiments were terminated, and the phosphate content of the various soil layers was determined.

According to the analytical results it was found that when only superphosphate is employed in silt loam the phosphate content is only increased in the topmost inch, but that with only stable manure, or stable manure plus phosphate, it increases considerably even down to the deepest layer. In the bottom layer the change in the phosphate content was much less. A considerable increase in the liberation was noticeable as soon as the stable manure was applied, although the total liberation was very insignificant.

In the sandy soil the results were similar, although the increase in the second layer was considerably greater than with the silt loam. It should also be noted that a much higher increase in the deepest layer was obtained by the addition of stable manure.

In calculating the balance between the phosphate supplied and that found afterward, it was found that the latter has increased by more than the phosphate supplied. The increase was much greater in the sandy soil. With the help of the stable manure, therefore, not only does the phosphoric acid in the fertilizer retain its solubility, but the stable soil compounds with the phosphoric acid are also rendered mobile.

Stable Manure Valuable

In top dressing experiments on grasses which the Department of Agriculture has carried out, better results have been obtained with stable manure, particularly on clover, than in em-

* Presented at the Annual Convention of the Royal Swedish Chamber of Agriculture, January 28, 1939. From Kungl. Lantbruksakademiens Tidskrift, No. 2, pp. 113-124 (1939).

** Central Station for Agricultural Research, Stockholm, Sweden.

ploying the same amount of nutriment in the form of commercial fertilizer. The favorable influence of stable manure on the solubility of phosphate undoubtedly makes an important contribution to this result.

A common practice is to spread the superphosphate right on top of the stable manure, and then to plow them down in together. This method of treatment is undoubtedly effective in preventing the phosphate from becoming quickly immobilized in the soil in an unsuitable manner, so that this treatment may be particularly suitable for acid soils containing highly immobilized phosphate. In pastures and hayfields such a procedure as spreading stable manure right on top of the phosphate may contribute to force the phosphoric acid down into the soil and in this way bring about a surface condition in which the highly sensitive root system is dried out and retarded. It must be borne in mind, however, that in many pastures and hayfields manuring is always occurring at such a rate that, the surface becoming saturated, a large amount of it can pass down to the next layer.

Problems relating to animal manure in connection with superphosphate were at one time under consideration in their bearing on another matter, that is, in connection with preserving animal manure for nitrogen compounds. As early as 1890 it was found that by scattering superphosphate--gypsum in the cowbarn it was possible to prevent practically any loss of nitrogen in the form of ammonia without thereby causing and diminution in the nitrate compounds. The preserving ability of superphosphate-gypsum has the closest connection with its content of water-soluble phosphoric acid, so that, according to Dannfelt, ordinary (not the concentrated) superphosphate is still better for the purpose, and about one pound of it per animal per day is sufficient. The superphosphate must be scattered right in the cowbarn in order to prevent the ammonia fermentation from quickly setting in.

Strange to say, this method has never found any extensive employment in this country. One of the reasons for this is that it has been feared that the basic nature of the phosphoric acid would cause it to be transformed into a less soluble form and thus become less easily available to the plants. That this is not the case, however, is shown by recently published reports on researches.*

The nutritive condition of the soil usually varies considerably from place to place. The expression "from place to place" as herein employed is intended to mean not only from one place in one agricultural region to another place in another agricultural region, but also from one property to another property in the same agricultural region, and from one field to another on the same property and, finally from one place to another in the same field. This applies not only when the soil is of different physical appearance (loamy, sandy or muck), but also if it is uniform in appearance.

* See Vermont Agric. Expt. Station Bulletin No. 419. *Editor.*

Local Variations in Soils

Acid, lime-poor soils frequently alternate irregularly with non-acid, lime-rich soils; soils with an unsatisfactory phosphate-producing ability occur side by side with soils whose phosphate-producing ability is entirely satisfactory, and so on. To be sure, a certain category of soils occurs comparatively more frequently in one agricultural region than in another, or in one class of soil as compared with another. In the plains country of Scania, for example, most of the soil is "phosphate rich," while in the plains of West Gotha it is "phosphate poor," but in the former region "phosphate poor," and in the latter "phosphate rich" soils are irregularly interspersed. It is therefore impossible to work out any standard fertilizing method to apply to all of the various farms (or to the various fields on the same farm), even if they are situated in the same agricultural region, or belong to the same soil type, but the fertilizing method must be worked out for each particular case.

In order, therefore, to obtain the most economical fertilizing results, every farm must be fertilized in accordance with the requirements of the particular soil and the particular crop concerned. The soil is the most important consideration. Because of the various factors involved, such as liming, stable manure, phosphate fertilizer, potash fertilizer, and even in some cases nitrogen fertilizer, the problem is complicated. Plants cannot utilize these food materials directly. Soil agencies must first act on the fertilizers to transform them into materials assimilable by plants. The soil plays an intermediary role in determining the value of the fertilizer as a source of plant food. The way in which the soil performs its role of intermediary between the plants and the source of nourishment is determined by its physical and, to a higher degree, by its chemical characteristics. Therefore, a fertilizing plan which is correct in every particular requires an accurate knowledge of the physical and chemical properties of the soil in each particular case. Modern soil analyses can provide the necessary information in this respect. The best way to

publish such information is in the form of soil maps. In order to enable such soil maps to be correctly and exhaustively interpreted and utilized, means must be provided to compare them with the findings of experiments in the field. For the individual farmer it is not sufficient merely to know the nutritive condition of his soil (meaning usually the lime condition). It is at least equally important to know how the unsatisfactory nutritive condition can be improved in the most economical manner. In order to determine this problem, a series of field experiments extending over many years is necessary. This must be carried out according to a plan based in each particular instance on the general physical and chemical characteristics of the soils under consideration.

If the experiments are planned from the very start with reference to the characteristics of the particular soils concerned, such as type, acidity, phosphate condition, and so on; and if the material used is chosen with reference to these soil characteristics, as well as the particular crops and climate concerned, then an average value can be reached whereby the farmer can work out a good guide for a practical fertilizer program, provided he adapts the general average result to his own particular conditions.

Soil Analysis

Soil analysis is, therefore, the basis on which field experiments are to be carried out, first with reference to the planning and starting of the experiments in the field, and afterward with reference to carrying on the experiments as a whole.

The method of soil analysis for determining the phosphate condition, as employed in soil mapping and worked out with reference to local field experiments, and also more recently with reference to all the agro-geological mapping in Sweden, is the so-called lactate method. The chemical and technical procedures for this method of soil analysis were conceived and worked out by H. Egner, the chief chemist of the chemical department of the central station (which has since become the Agricultural University). This method has been subjected to very extensive checking by the Department of Agriculture, and has been compared with the findings of many thousands of box experiments and more than 20,000 field experiments. From this work there have been obtained many valuable indications of necessary corrections to be made with reference to soil types, pH values, and other soil factors, and also, in certain cases, indications of changes which must be undertaken in the method itself in order to make the soil tests generally applicable under actual field conditions.

It should be mentioned also that the lactate method, as thus further developed by the Department of Agriculture, has recently been adopted in Germany as the official chemical method for determining the phosphate condition of the soil from the standpoint of plant nourishment.

With the end of the year 1938 there also came to an end what may rightly be regarded as a very important phase in the history of agricultural experiment in Sweden. For the central station for experimental research on agriculture, having transferred to the Agricultural University its work on both agriculture proper and animal husbandry, wholly ceased to exist. The principal work remaining to this division of the Department of Agriculture during the past ten years has been to work in close collaboration with the farming societies in connection with local experimental projects, and this has produced some excellent results. This is particularly true when it is remembered that the results of these efforts have brought about changes in many respects in methods of applying both phosphate and lime, and in providing opportunities for solving these problems in a more satisfactory manner than formerly with regard to any particular branch of agriculture concerned.

Summary

This article constitutes a report on the research and experimental work in problems in connection with phosphate and lime fertilizing which has been carried on during the past ten years by the Department of Agriculture at the national central station for agricultural research.

The solubility behavior and the mobility of phosphoric acid derived from superphosphate in the soil have been thoroughly studied. It has been found that in mineral soils with an acid reaction this material enters at once into very stable compounds, and that it moves about only slightly with the ground water. It is therefore of the greatest importance to plow phosphate fertilizers far down into the soil. The immobility of phosphoric acid is also reflected in the vertical distribution of the phosphate in the soil. The content of plant-soluble phosphoric acid in the farm soil is, therefore, always higher in the furrow than in the subsoil, and the dividing line between these two layers is very definite. In permanent meadows and pastures the phosphate content at the surface

(Continued on page 20)

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Principal Articles in This Issue

Winter Legumes as Soil-Improving Crops for Cotton

By E. B. Reynolds, Chief, Division of Agronomy, College Station, Texas

During the last several years the Texas Agricultural Experiment Station has conducted experiments at Angleton, College Station, Nacogdoches, and Tyler to determine the value of winter legumes and oats as soil-improving crops for cotton. This work has included the use of hairy vetch at College Station; hairy vetch and oats at Tyler; hairy vetch, oats, and a mixture of oats and vetch at Nacogdoches; and yellow annual sweet clover at Angleton. Some plats of the vetch were fertilized with 400 to 500 pounds of an 0-8-4 fertilizer per acre, but the other plats of vetch received nothing. At Angleton some of the yellow annual sweet clover received no fertilizer and some of it 400 pounds of 0-8-4 fertilizer per acre in the fall and 200 pounds for cotton after the clover was plowed under. The green-manure crops were planted in the fall and plowed under in the spring.

At Tyler fertilized vetch plowed under produced an increase of 58 per cent over the yield of unfertilized cotton in three years of experiment. In these experiments hairy vetch when plowed under furnished all the nitrogen necessary for a good cotton crop.

At College Station, vetch fertilized with 0-8-4 produced an increase of 43 per cent in the yield of cotton. Additions of nitrogen to the cotton following fertilized vetch did not further increase the yield, showing that the vetch supplied enough nitrogen for the crop. A 43 per cent increase over unfertilized cotton was also produced by the application of 500 pounds of 4-8-4.

At Nacogdoches the vetch treatments produced 44 per cent increase over untreated soil. Here the application of 400 pounds of 4-8-4 fertilizer per acre produced 70 per cent more than cotton on unfertilized soil and 20 per cent more than that treated with vetch.

At Angleton, clover was substituted for vetch in the treatment and produced 13 per cent more than the untreated soil. Here clover did not supply enough nitrogen for cotton and both phosphate and nitrogen needed to be added for maximum yields. The clover did not produce enough vegetative growth to be of much value at the time it was necessary to plow the land for planting cotton.

These results show definitely that all of the soils on which the work was conducted responded readily to nitrogen in the green manure and to applications of phosphate. The

results on the sandy soils at College Station, Nacogdoches, and Tyler indicate that plowing under vetch should increase the yield of cotton 40 to 60 per cent. These increases in yield of cotton should be worth $1.50 to $3.00 for each dollar spent for vetch seed and fertilizer.

The effect of plowing under the green manures on the yield of cotton has been considered. Now the yields of vetch, the amount of nitrogen in the vetch, and the quantity of nitrate nitrogen in the soil resulting from the decomposition of the vetch at College Station will be considered. Vetch fertilized with superphosphate and potash made an average yield of 1.2 tons of air-dry matter per acre, equivalent to about 4 tons of green material, for the four years 1937-1940. The average amount of vetch has added 80 to 90 pounds of nitrogen to the soil yearly. The yield and height of the vetch has varied from year to year, but it has been observed that a good stand of vetch 4 to 8 inches high when it is plowed under contains enough nitrogen for a good crop of cotton.

Soil on which vetch was plowed under contained two to three times as much nitrate nitrogen as untreated soil or soil that received 500 pounds of 4-8-4 fertilizer during the growing season. For example, as an average for June of the four years 1937-49 and the soil on which vetch was plowed under contained 54 pounds of nitrate nitrogen per acre in the surface soil and the soil that received 500 pounds of fertilizer contained only 24 pounds. Despite this great difference in nitrate nitrogen the treatments produced about the same yields of cotton. From these results it is clear that vetch added more nitrogen to the soil than the cotton crop could use efficiently.

SHEFFIELD ELECTED PRESIDENT OF CORONET PHOSPHATE CO.

John R. Sheffield was elected a director and president of the Coronet Phosphate Company on February 3d. The office of president had been vacant since the death of C. G. Memminger in 1930.

Mr. Sheffield has been associated with the Company for the past year. He was earlier associated with the Phosphate Export Association as its Assistant European director with offices in London; with the New York office of the Phosphate Recovery Corporation; and with the Dorr Company. He is a graduate of the Massachusetts Institute of Technology.

At the directors' meeting a dividend of 50 cents a share was declared payable February 15th to shareholders of record on February 8th.

Obituary

W. DE C. KESSLER

Another valued member of the industry has been lost through the death of W. de C. Kessler, Division Manager of the American Agricultural Chemical Company, who died at Montgomery, Ala., on February 4th, following an attack of pneumonia.

Mr. Kessler, who was 75 years old at the time of his death, was born at Elkton, Md., and as a boy became identified with the fertilizer industry in Baltimore.

In 1889 he went to Pensacola, Florida, as secretary-treasurer of the Goulding Fertilizer Company, a subsidiary of W. & H. M. Goulding, Limited, of Dublin, Ireland.

In 1898 Mr. Kessler went abroad for the purpose of studying designs for a plant for the manufacture of double superphosphate at Pensacola where the first double superphosphate manufactured in the United States was produced under his supervision.

He moved to Montgomery, Alabama, in 1907 to become associated with the Goulding and Bigbee companies, which businesses were purchased by The American Agricultural Chemical Company in 1911, Mr. Kessler continuing as manager until his decease.

Mr. Kessler was identified with the social, civic, fraternal, and business affairs of his adopted cities, and during the year 1905-1906 served as President of the Fertilizer Manufacturers Association.

He was a Past Master of Escambia Lodge, F. & A. M., of Pensacola, Fla., and a member of Alcazar Temple, Nobles of the Mystic Shrine, of Montgomery, Ala.

He is survived by his wife, who was Miss Eleanor Berret of Sykesville, Maryland, and two sons, John and Berret, and four grandchildren.

In announcing Mr. Kessler's death, his company paid the following tribute: "Mr. Kessler was widely known throughout the Southeast, where he elected to spend most of his lifetime. He was endowed with an attractive personality and a courageous heart. He was loved by a host of friends, and respected by all who knew him. Serving for so long a time as a manager for The American Agricultural Chemical Company, he became the dean of the selling organization. His wise counsel was at all times sought by his company."

Large Increase in AAA Soil-Building Materials During 1940

The Agricultural Adjustment Administration has announced that a summary of its 1940 conservation materials program shows United States farmers obtained a record amount of materials for use in carrying out AAA soil-building practices, including lime, superphosphate, winter legume seed, and seedling trees.

The summary shows orders were placed by farmers under the 1940 program for 3¼ million tons of liming material, 177,000 tons of concentrated superphosphate, 160,000 tons of 20 per cent superphosphate, nearly 38 million pounds of Austrian winter pea seed, more than 5 million pounds of hairy vetch seed, 510.000 pounds of Italian rye grass seed, and more than 3 million seedling trees.

The distribution of conservation materials supplements the regular practice provisions of the AAA Program, through which farmers receive cash payments for carrying out approved soil-building practices.

Under the conservation materials program, farmers in designated areas may obtain from the AAA the materials to be used in carrying out certain conservation practices. The value of such materials is deducted from payments which they otherwise would receive.

This plan was first put into effect in 1937 as the grant-of-aid program, when a quantity of superphosphate was distributed in 10 Southern and Eastern States. Lime, winter legume seed, and seedling trees have since been added and the plan has been extended to 33 States.

Liming materials, amounting to 3,275,455 tons, comprised the largest total of conservation materials distributed under the 1940 program. Farmers of 29 States ordered liming materials from the AAA, using them to improve acid soils, particularly where the land is utilized in growing soil-building crops such as legumes and grasses. This compares with 682,514 tons of liming materials supplied by the AAA to farmers in 18 States in 1939.

Superphosphate was distributed to farmers of 33 States in 1940, enabling them to improve phosphorus-deficient lands used in growing soil-building crops. In terms of the equivalent of concentrated superphosphate containing approximately 48 per cent phosphoric acid, a total distribution of 243,477 tons was made during the year. This represents a substantial increase over 1939 when farmers of 25 States received the equivalent of 143,471 tons of concentrated superphosphate.

The bulk of liming materials and superphosphate distributed under the conservation materials program has been purchased by the Government from private manufacturing concerns. In the case of superphosphate, 70,515 tons were purchased in 1940 from the Tennessee Valley Authority and the remainder from commercial manufacturers.

Winter legume seed were distributed under the 1940 program mainly in Southeastern States for use in providing cover to protect the soil from erosion and leaching during winter months. The seed were produced principally by Oregon farmers under a plan sponsored a year ago by the AAA and the Commodity Credit Corporation. The plan encouraged expansion of winter acreage in designated Pacific Northwest areas through assuring growers a fair return for harvested seed. This increase in domestic seed production was encouraged to assure Southern farmers a stable and continuing supply of pea and vetch seed. In the past, much of this seed has come from countries in Southeastern Europe, a source which has become increasingly uncertain. This plan is also in line with the AAA's policy of encouraging soil conservation and expansion of

(Continued on page 24)

FERTILIZER MATERIALS MARKET

NEW YORK

Potash Deliveries Slow But Supply Ample for Domestic Needs. Granting of Export Licenses for Potash and Sulphate of Ammonia Problematical.

Exclusive Correspondence to "The American Fertilizer."

NEW YORK, February 11, 1941.

Deliveries of potash are still somewhat behind but there will undoubtedly be sufficient material delivered to take care of all needs of fertilizer manufacturers during the season.

The movement of sulphate of ammonia also continues with continued demand for export.

There is a special demand from Spain for sulphate of ammonia at this time with no indication as to whether export licenses would be granted for such shipment.

Nitrate of Soda

Ample supplies are on hand at regular price of $27.00 in bulk, $28.70 in 200 lb. bags and $29.40 in 100 lb. bags.

Superphosphate

There is no change in the price situation and demand is nominal.

Triple Superphosphate

The Government has inquired for additional quantities of triple superphosphate but material is available to domestic users at regular schedule price.

Potash

Some material has recently been sold at full schedule for domestic use. There has been no indication as yet as to the Government's attitude toward granting of export licenses for export of potash salts.

Bone Meal

South American 4½ and 45 per cent raw bone continues to be quoted at $32.00, c.i.f., but even at this price it is hard to work business because of freight scarcity.

Tankage

Local market is easier and unground 9/10 per cent can be worked at $2.50 ($3.04 per unit N).

Dried Blood

This market has also shown decline with trade this week at $2.50 ($3.04 per unit N) and additional supplies available at the same figure.

Nitrogenous

Steady, in the absence of new business, prices are strictly nominal.

Fish Scrap

In the absence of any offerings of either domestic or Japanese, there is no activity whatsoever in this article.

BALTIMORE

Pre-Season Lull Continues. Little Change in Market Conditions. Potash Supplies Ample.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, February 11, 1941.

As is usual at this time of the year, the demand for fertilizer materials has been practically at a standstill, as the shipping season will not open up until after March 1st, and in the interim all manufacturers have their warehouses crowded to capacity. In spite of the lack of interest, however, there has been very little change in market conditions.

Ammoniates.—The price of tankage for feeding purposes is still in the neighborhood of $3.10 per unit of nitrogen, while South American blood continues to be quoted at $3.20 per unit of nitrogen, c.i.f. Atlantic ports, subject, however, to freight room being obtainable.

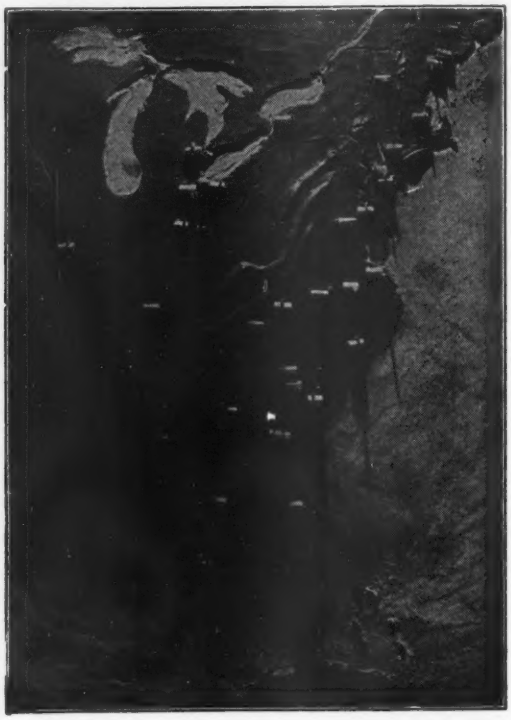
Nitrogenous Material.—The market on this ingredient is strictly nominal at $2.55 to $2.65 per unit of nitrogen, f.o.b. Baltimore, with practically no interest being shown.

Sulphate of Ammonia.—This commodity continues scarce, with practically no resale offerings obtainable. The market for export is

A Complete Service

THE strategic factory locations of the American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

We manufacture all grades of Commercial Fertilizers, Superphosphate, Agrinite Tankage, Bone Black, Bone Black Pigments (Cosmic Black), Dicalcium Phosphate, Monocalcium Phosphate, Gelatin, Glue, Ground Limestone, Crushed Stone, Agricultural Insecticides (including Pyrox, Arsenate of Lead, Calcium Arsenate, etc.), Trisodium and Disodium Phosphate, Phosphorus, Phosphoric Acid, Sulphuric Acid, Salt Cake; and we are importers and/or dealers in Nitrate of Soda, Cyanamid, Potash Salts, Sulphate of Ammonia, Raw Bone Meal, Steamed Bone Meal, Sheep and Goat Manure, Fish, Blood and Tin-Tetrachloride. We mine and sell all grades of Florida Pebble Phosphate Rock.



FACTORIES

Alexandria, Va.
Baltimore, Md.
Buffalo, N. Y.
Carteret, N. J.
Cayce, S. C.
Chambly Canton, Quebec, Can.
Charleston, S. C.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
East Point, Ga.
East St. Louis, Ill.
Greensboro, N. C.
Henderson, N. C.
Montgomery, Ala.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont., Can.
Presque Isle, Me.
Savannah, Ga.
Searsport, Maine
South Amboy, N. J.
Spartanburg, S. C.
West Haven, Conn.
Wilmington, N. C.
Havana, Cuba

The AMERICAN AGRICULTURAL CHEMICAL Co.

50 Church Street, New York City

SALES OFFICES

Alexandria, Va.
Baltimore, Md.
Buffalo, N. Y.
Carteret, N. J.
Charleston, S. C.
Cincinnati, Ohio
Cleveland, Ohio
Columbia, S. C.
Detroit, Mich.
East Point, Ga.
East St. Louis, Ill.
Greensboro, N. C.
Henderson, N. C.
Houlton, Me.
Laurel, Miss.
Montgomery, Ala.
Montreal, Quebec, Can.
New York, N. Y.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont.
Savannah, Ga.
Spartanburg, S. C.
St. Paul, Minnesota
Wilmington, N. C.
Havana, Cuba

still strong at $42.00 to $45.00 per ton, in double bags, f.a.s. Baltimore.

Nitrate of Soda.—There has been a gradual improvement in the demand and the Chilean Champion Brand continues to be quoted at $29.40 per ton of 2,000 lb., packed in 100 lb. bags, ex port warehouse, with usual differential for bulk and 200 lb. bags.

Fish Meal.—The limited tonnage of sardine meal still obtainable is firmly held at $59.00 to $60.00 per ton, f.o.b. Baltimore.

Superphosphate.—Producers are now busy making deliveries against contracts previously booked, and the market remains firm at previously quoted levels of $8.00 per ton of 2,000 lb., for run-of-pile, basis 16 per cent, and $8.50 for flat 16 per cent grade, both in bulk, f.o.b. producers' works, Baltimore.

Bone Meal.—There is practically no demand for either raw or steamed bone meal. 3 and 50 per cent steamed bone meal ranges from $32.00 to $34.00 per ton, f.o.b. Baltimore, according to mechanical condition, while South American 4½ and 47 per cent raw bone meal is quoted at $31.00 to $32.00 per ton, c.i.f. Baltimore.

Potash.—It would now appear that all fertilizer manufacturers will be able to secure their normal requirements, as a result of which there have been practically no re-sales made, although there is some obtainable at 55 cents per unit for muriate, in bulk.

Bags.—The market on burlap has receded somewhat during the past two weeks and is now in the neighborhood of $128.50 per thousand, f.o.b. Baltimore for plain, new 10 oz. bags, basis 40 cut 54 in. for spring delivery. However, most of the manufacturers have already covered for their wants, and there is very little interest being shown in additional supplies.

CHARLESTON

Spot Supplies of Organics Scarce, also Sulphate of Ammonia and Ammonia Liquids. Fish Meal Scarce.

Exclusive Correspondence to "The American Fertilizer."

CHARLESTON, February 10, 1941.

Some sellers of organics now do not wish to quote for earlier than April shipment. Sulphate of ammonia continues extremely scarce and this also applies to the liquid ammonias.

Nitrogenous.—Domestic can be obtained around $2.50 to $2.60 ($3.04 to $3.16 per unit N), delivered Southeastern ports.

Blood.—Around $3.00 ($3.64½ per unit N), Chicago, bulk; $2.50 ($3.04 per unit N), c.i.f. Atlantic ports, in bags, but freight can hardly be worked to any ports south of Norfolk or Baltimore.

Tankage.—Fertilizer grade around $2.60 to $2.70 ($3.16 to $3.28 per unit N) and 10 cents, f.o.b. Chicago.

Fish Meal.—Supplies of all kinds of fish remain exceedingly scarce.

Cottonseed Meal.—Around $31.30 for 8 per cent at Atlanta and $25.00 for 8 per cent at Memphis.

ATLANTA

Little Activity in Market. Food Crops Expected to Replace Decreases in Cotton and Tobacco.

Exclusive Correspondence to "The American Fertilizer."

ATLANTA, February 10, 1941.

Very little activity has been manifested in the fertilizer materials market during the past week or ten days, although the passing of each week brings us that much nearer the spring shipping season which is just around the corner.

While the South will suffer from a lessened demand for both cotton and tobacco, it is felt

that food crops of various kinds which will supplant the above two mentioned crops where they are curtailed, will more than offset the lack of revenue from these sources.

There has been little or no change in prices since the turn of the year and the demand on the whole has only been nominal as replacement orders are not yet manifesting themselves.

Cottonseed meal is slightly easier in this section, with prime 8 per cent being quoted Memphis basis for February-March at $24.50 to $25.00.

Both soya bean meal and peanut meal seem to be in plentiful supply and have doubtless had an effect on cottonseed meal.

Soya bean meal, 8.75 per cent ammonia, is currently quoted at $24.00 Decatur, whereas South Georgia peanut meal is being quoted at $20.50 f.o.b.

CHICAGO

Lack of Fill-In Demand Noticeable. Prices Remain Firm. Feed Market Easier.

Exclusive Correspondence to "The American Fertilizer."

CHICAGO, February 10, 1941.

An unchanged, rather quiet situation in organics is apparent. So far the looked-for "fill-in" demand has not appeared. Meanwhile, the prices asked by sellers show no selling urgency. The market, therefore, cannot be called weak, nor can it be classified as strong; buying or lack of it in the near future will determine its true position.

Demand in feed material has tapered off recently, leaving the materials market easier.

Nominal prices are as follows: High-grade ground fertilizer tankage, $2.25 to $2.50 ($2.73½ to $3.04 per unit N) and 10 cents; standard grades crushed feeding tankage, $3.00 to $3.10 ($3.64½ to $3.77 per unit N) and 10 cents; blood, $3.00 to $3.10 ($3.64½ to $3.77 per unit N); dry rendered tankage, 60 to 62 cents per unit of protein, Chicago basis.

WILMINGTON

Market Quiet. Increased Spring Tonnage Expected. Fish Materials Very Scarce

Exclusive Correspondence to "The American Fertilizer."

WILMINGTON, February 10, 1941.

The fertilizer material market continues very quiet, with no trading of consequence noted. The movement of fertilizer has been limited to plant-bed material and the trade generally anticipates a slight increase in tonnage over last year. Purchases to date have provided for such a movement, and while markets are firm, there is practically no actual buying.

Cottonseed meal continues to weaken, but fish scrap is very strong; in fact, it is impossible to buy any quantity now, and the fish season is definitely over.

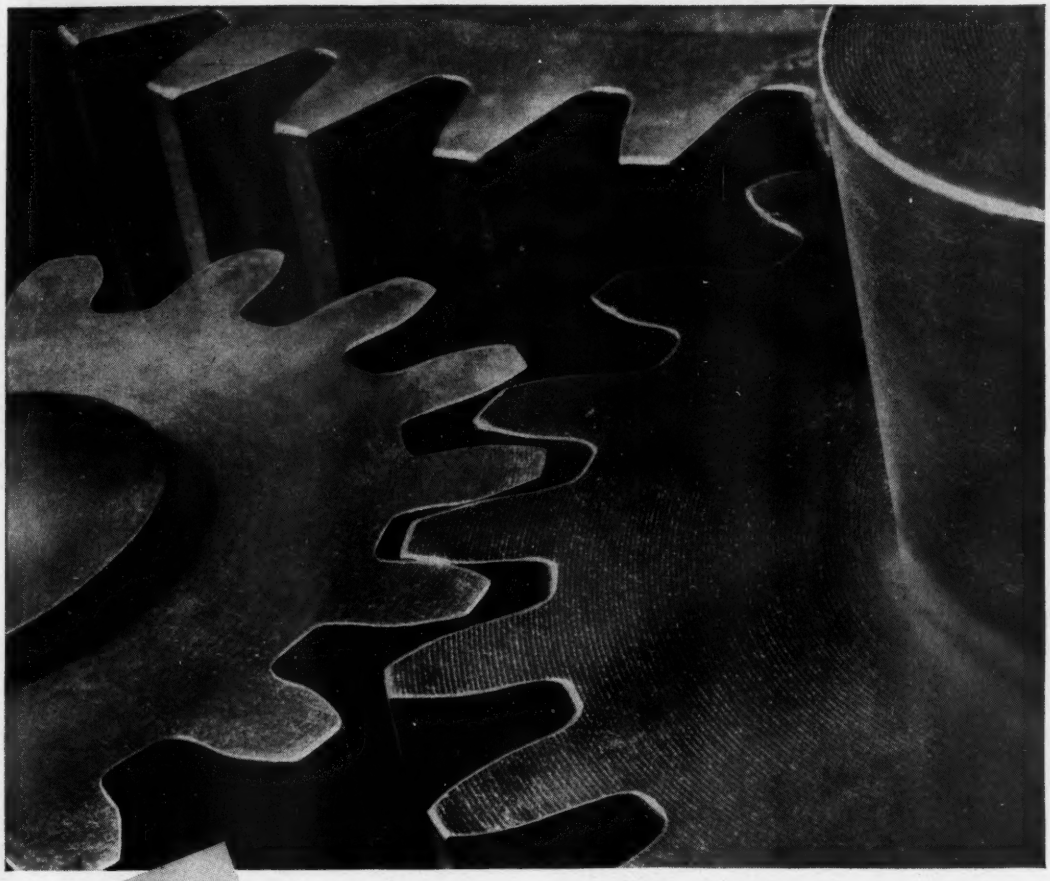
TENNESSEE PHOSPHATE

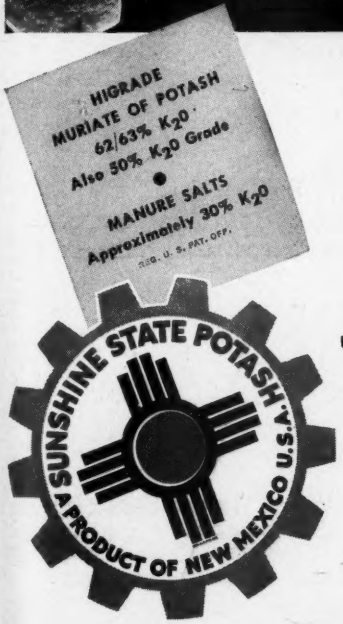
Increase in January Ground Rock Shipments. Total Phosphate Production in 1940 Exceeds That of 1939. Larger Tonnages for 1941 Expected.

Exclusive Correspondence to "The American Fertilizer."

COLUMBIA, TENN., February 10, 1941.

The weather so far in 1941 has been very much more open in the entire area in which farmers take ground rock from Tennessee, than it was during the 1940 same period. This accounts for some of the very marked increase of over 60% which has taken place in January, with prospects of similar or even greater increase in February above 1940. Of course, much increase is normally to be expected from the great publicity being given by the AAA and TVA programs to phosphates.





GEARED FOR SMOOTH RUNNING

TO meet this country's need for adequate domestic supplies of potash, men and equipment at the United States Potash Company's mine and refinery are geared to peak efficiency. Employees and management alike recognize the new responsibility which has been placed on our nation's potash industry now that foreign supplies of this vital element have been virtually cut off.

But need for production will never cause us to neglect the quality of Sunshine State Potash. In peak as well as normal times, technical specialists, backed by complete laboratory facilities, control every step in production. Today more fertilizer producers than ever before depend upon Sunshine State Potash for consistently uniform analysis and careful sizing which makes handling and blending easy.

UNITED STATES POTASH COMPANY, INC.
30 ROCKEFELLER PLAZA
NEW YORK, N. Y.

Contract for grading sites for the TVA sintering plant at Godwin and the mining and washing plant at the Akin place have been let and the spur track from the L. & N. at Godwin has been put in, so that considerable showing will soon be made on this million dollar project.

All plants seem to have been put in good shape and are in active operation getting off last minute requirements of the acidulating plants in preparation for the active fertilizer shipping season.

Exact figures are not yet available, but every indication is that the 1940 shipments of all kinds exceeded the peak year of 1939, notwithstanding the switch by TVA of most of its purchases to Florida, on account of cheaper price.

Prospects of business, so far as can be summarized now, indicate even larger tonnage for 1941. The authorities in Illinois state that over 50,000 tons of ground phosphate rock were used in that state for direct application in 1940 and that 75,000 tons will probably be used in 1941.

At the fertilizer conference of District 10 recently it was stated that over 70 per cent of the TVA and AAA superphosphates furnished under the AAA program, which, by the way, in Kentucky alone, took up about half the TVA production of treble super, were used under soil-depleting crops and, of course, in direct competition with the commercial fertilizer industry and that in no case yet reported had the authorities done anything about it.

If the figures reported for use of ground phosphate rock in various states are anywhere near accurate, the railroads seem to have lost more than 30 per cent of this business to trucks, and have no one but themselves to blame for it in view of the heterogeneous condition of the freight rate situation. When a farmer has to pay around $5.00 per ton freight to his own railroad station, but can send trucks to stations many miles farther from the mines than he is and get rate of $2.82, he, of course, does that and the high-freight road gets no business. It is then only a step for him to send his truck all the way to the mines and all the railroads lose the business. All three loading plants are having to make expensive installations to be able to readily load trucks, as all the plants were designed for railroad handling, with no truck hauling expected.

SUPERPHOSPHATE PRODUCTION HIGHER IN 1940

According to figures compiled by the National Fertilizer Association, the production of superphosphate during 1940 was 15 per cent higher than in 1939, and was only slightly below the peak figures of 1937. During 1940, production totaled 3,784,405 tons and shipments 4,096,643 tons, compared with 3,297,502 tons and 3,779,287 tons respectively in 1939.

RECENT EXPERIENCE WITH PHOSPHATE FERTILIZER

(Continued from page 11)

(0 to 2 inches) is very high, but it diminishes rapidly downward, and reaches at a depth of 2½ to 4 inches the same value as in the actual subsoil.

The cultivated ground in Sweden consists to a very large extent of more or less loamy mineral soil with an acid reaction and an unsatisfactory phosphate condition. In such a soil the conditions for bringing about a satisfactory fertility level of phosphate are usually less favorable than elsewhere because the phosphoric acid applied is fixed into such insoluble compounds as to make it difficult or impossible for the plants to obtain any phosphorus. The

only way to obtain a better fertilizing effect is to provide the soil with such a large amount of phosphate that it becomes "saturated" with phosphoric acid. Most farmers are unable to purchase the large amounts of phosphate which are required. In order to overcome these difficulties the following expedients are recommended:

1. The soil is first fertilized with lime.
2. Thomas phosphate fertilizer, or some other fertilizer having the same chemical composition, is applied.
3. If superphosphate is to be used, it should be the granulated form only.
4. Granulated superphosphate gives the best results if it is distributed by means of a conventional drilling machine, 2½ to 4 inches deep and in rows about 5 inches apart.
5. Conventional pulverized superphosphate is mixed, prior to being spread, with large amounts of animal manure.

It is further brought out that, due to the fact that the lime and phosphate conditions of the soil change considerably and irregularly from place to place, it is necessary to prepare soil maps which show soil type, its pH value, and its phosphate condition, the latter factor being determined by means of Egner's lactate method. The planning of any fertilizing or liming experiments in the field should always be based on such a soil map. The places in the field to be used in the experiments are selected with reference to the map. Finally, the experimental findings are tabulated on the basis of the soil characteristics studied. In this way it becomes possible to prepare tables which can serve as a guide to farmers whose soils are mapped but who are unable to have experiments carried out on their farms.

EDITOR'S NOTE—Because of an error in applying a conversion factor to determine pounds per acre, the following corrections should be made in the first portion of this article, which was published in the issue of February 1, 1940:

Page 10, 1st column, 26th and 27th lines, should read "in the proportion of about 1,760 pounds to 2,640 pounds of superphosphate per acre."

Page 11, 1st column, 4th line, should read "about 242 pounds more per acre"; 9th line should read "about 88 pounds per acre"; 6th and 7th lines from bottom should read "4.5 to 9 pounds of 20% superphosphate"; bottom line should read "132 to 440 pounds of 20% superphosphate."

Page 26, 2d column, 20th line, should read "by more than 440 pounds per acre."

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O. Franck: "Should a pasture, due to the presence of phosphoric acid in its topmost layer, be put into crops?" An article presented to the N. J. F. convention at Ultuna in 1938.

O. Franck: "Some experimental findings on the cultivation, liming and fertilizing of silt loam," an article presented to the N. J. F. convention at Ultuna in 1938.

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See Page 4

AMMONIUM SULPHATE BOOSTS IDAHO SEED YIELD

When crested wheat seedings become 4 to 5 years old many of them produce less than one-third the yield produced in the second year. This is due to the fact that crested wheat, being a non-legume, depletes the soil of its available nitrogen supply. In order to obtain information as to how yields could be maintained for a longer time, demonstrations have been conducted by the Idaho Experiment Station in which ammonium sulphate was applied at the rates of 35, 70, and 100 pounds per acre. Results obtained in these demonstrations have shown that application of 100 pounds of ammonium sulphate per acre has increased the yield three to five times. Results obtained on the M. M. McConnell farm near Reubens in 1939 show that the application of 100 pounds of ammonium sulphate applied in the fall of 1938 at an expense of $2.50 increased the yield from 285 pounds of seed on the untreated plot to 1,245 pounds on the ammonium sulphate treated plot.

On the L. P. Teats farm near Reubens the yield was increased from 233 pounds on the check to 854 pounds on the plot receiving 100 pounds of ammonium sulphate. Both of these demonstrations were on 3-year-old crested wheat seedings.

SOUTHERN STATES COOPERATIVE SALES INCREASE

Sales of the Southern States Cooperative increased 11 per cent to $6,984,000 in 1940, it was reported last week at the conference of the regional advisory board. It was also stated that an equity of $2,000,000 had been built up for members and that the organization paid $365,000 in patronage dividends. Membership increased from 89,000 to 100,000.

LARGE INCREASE IN AAA SOIL BUILDING MATERIALS

(Continued from page 14)

non-surplus crops that will contribute to farm income.

Under the 1940 program, winter legume seed totaling 42,890,227 pounds, including 37,816,557 pounds of Austrian winter pea seed and 5,073,870 pounds of hairy vetch seed, were distributed.

Table I

Superphosphate Distributed Under the 1939 and 1940 Agricultural Conservation Materials Programs

State and Region	Triple Superphosphate 1939	Triple Superphosphate 1940[1]
Northeast	*Tons*	*Tons*
Maine	4,308	4,914
New Hampshire	4,108	5,217
Vermont	4,699	6,292
Massachusetts	1,785	2,305
Rhode Island	206	343
Connecticut	769	963
New York	....	....
Pennsylvania	....	770
Total	15,875	20,804
North Central		
Illinois	....	544
Indiana	224	2,274
Iowa	....	1,351
Minnesota	....	180
Missouri	....	4,229
Ohio	393	2,488
South Dakota	....	....
Wisconsin	....	4,153
Total	617	15,219
East Central		
Maryland	103	169
Virginia	16,195	14,822
West Virginia	16,488	12,082
North Carolina	3,514	5,074
Kentucky	37,968	57,946
Tennessee	18,176	22,065
Total	92,444	112,158
Southern		
Alabama	4,208	2,000
Arkansas	5,701	12,873
Florida	....	42
Georgia	192	187
Louisiana	22	665
Mississippi	462	2,306
Oklahoma	127	316
South Carolina	26	....
Texas	29	228
Total	10,767	18,617
Western		
Arizona	....	112
Oregon	2,444	5,154
Washington	1,675	4,935
Total	4,119	10,201
Grand Total	123,822	176,999

(Continued on page 26)

State and Region	20% Superphosphate 1939	1940[1]
Northeast	*Tons*	*Tons*
Vermont	17,584	7,281
Connecticut	....	20
New York	....	20,937
Pennsylvania	17,066	5,482
Total	34,650	33,720
East Central		
Maryland	....	531
Virginia	....	6,166
West Virginia	....	1,729
North Carolina	....	4,919
Kentucky	....	41,454
Tennessee	....	16,619
Total	....	71,418
Southern		
Alabama	....	36,152
Florida	....	247
Georgia	....	17,801
South Carolina	....	208
Total	....	54,408
Grand Total	34,650	159,546

[1]Preliminary

LINK-BELT ISSUES NEW CATALOG ON ROTO-LOUVRE DRYER

The completion of a new catalog and engineering data book, No. 1911, on the Link-Belt Roto-Louvre Dryer, is announced by Link-Belt Company, 300 W. Pershing Road, Chicago.

This dryer, also used as a cooler, is recommended for the drying of coal, ore, sand, granules, powders, pulps, earths, cereals, sugars, fruits, starches, seeds, pomaces and many other products of the mine, chemical, food and agricultural industries.

The new book has 24 pages replete with valuable data on Roto-Louvre drying, and contains both photographs and drawings of typical installations.

A copy will be sent to any interested reader upon receipt of request addressed direct to the company.

PROPOSED MERGER OF I. A. C. AND UNION POTASH & CHEMICAL CO.

(Continued from page 7)

stock, of which 658,611 shares will be outstanding. Of the outstanding preferred shares, 1,000 are subject to payment at the option of the holders within 30 days of consummation of the merger, at $100 per share. The unissued 41,389 shares of common stock may be issued and sold from time to time, other than to directors or officers of the continuing corporation, in such manner, for such corporate purposes, and for such consideration as may be permitted by law, and as may be fixed by the board of directors, without further action on the part of stockholders.

As a result of such exchanges, present International Agricultural Corporation preferred stockholders will hold 53.2 per cent, present common stockholders of that corporation will hold 16.5 per cent, and the present minority common stockholders of Union Potash & Chemical Company will hold 30.3 per cent of the outstanding common stock of the continuing corporation.

No fractional shares of 4 per cent cumulative preferred stock or common stock will be issued, but scrip certificates will be issued in lieu thereof, which, when accompanied by similar scrip certificates in appropriate amounts, will be exchangeable, until April 1, 1943, for full shares and the amount of dividends theretofore paid.

On the basis of the continuance of the present volume of business, and if no unforeseen circumstances arise, and in the event of the consummation of the merger, it is expected that a dividend on the new 4 per cent cumulative preferred stock for the quarter beginning April 1, 1941, will be paid on June 30, 1941.

BUYERS' GUIDE

A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Company, The, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Company, The, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AUTOMATIC ELEVATOR TAKEUPS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Paper
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG-CLOSING MACHINES
Bagpak, Inc., New York City.

BAG PILERS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Work, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Work, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CALCIUM-NITRATE
Synthetic Nitrogen Products Co., New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

CASTINGS—Iron and Steel
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.

CHEMICALS—Continued
Huber & Company, New York City.
Phosphate Mining Co., The, New York City
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Phosphate Mining Co., The, New York City

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill. and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill. and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Co., Columbus, Ohio.
International Agricultural Corp., New York City.
Phosphate Mining Co., The, New York City
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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BUYERS' GUIDE

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MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Power Transmission
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corportion, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Agricultural Corp., New York City.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Du Pont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.
International Agricultural Corp., New York City.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Charleston Mining Co., Inc., Richmond, Va.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Phosphate Mining Co., The, New York City
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers and Importers
American Potash and Chem. Corp., New York City.
Potash Co. of America, Baltimore, Md.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
Bradley & Baker, New York City.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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BUYERS' GUIDE

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SCALES—Including Automatic Bagging
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

SCREENS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Including Vibrating
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill. and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.

SULPHURIC ACID—Continued
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Agricultural Corp., New York City.
Phosphate Mining Co., The, New York City
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Agricultural Corp., New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland Co., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
Du Pont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
Du Pont de Nemours & Co., E. I., Wilmington, Del.

VALVES—Acid-Resisting
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

WHEELBARROWS (See Carts)

ZINC SULPHATE
Tennessee Corporation, Atlanta, Ga.

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